The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Chemistry and the Law

IT is no longer true, as it was once supposed to be, that the criminal can be detected by his appearance. "He hath no drowning mark upon him," says Shakespeare, "his complexion is perfect gallows." The criminal to-day is become scientific; he or she is much as other men and women. We recollect in our youth a works foreman whose fellows referred to him as "the criminal man"; he had indeed a face and figure that made him almost the exact double of Charles Peace, but in all the years that we knew him his life was blameless and he was indeed one of the most trustworthy and conscientious of workmen. For aught we know he still is. Once the police have detected a citizen pursuing the path of crime, he is thereafter suspect and it is often not difficult to bring future crimes home to him if he should continue in that path. Even so, however, proof is essential, and that proof may be secured in many ways through the intervention of science. When a hitherto unsuspected citizen runs amok and becomes a thief, a coiner, a forger, or a murderer, detection is far more difficult.

The scientific criminal, the cleverness of Counsel, and the complexity of life have combined to cause the police to employ chemists. In all countries there are chemical departments attached to the police headquarters in which the resources of chemistry and physics are brought to the assistance of those who preserve law and enforce order. The work of these chemists is highly specialised and, since it concerns human life and liberty, must be undertaken with greatest circumspection. The tests applied must be exact and conclusive; no deductions must be drawn from them that are not fully justified both by the circumstances of the case and by the chemical limitations of the tests themselves. The multiplicity and complexity of the work of the police chemist is revealed in a recent book by Mr. H. T. F. Rhodes (*Forensic Chemistry*, Chapman & Hall, 12s. 6d. net) recently sent to us for review. A perusal of this work shows that the methods of the forensic chemist must be those of micro-analysis, and it would seem that he should first be experienced in that technique. It is next evidently necessary that he should become apprenticed to a forensic laboratory since, to judge by Mr. Rhodes's account of the work, no one could achieve the skill and discrimination necessary to gain reliable results without at the same time destroying the evidence, if he had not gained considerable experience in this way. Forensic chemistry is, in fact, a highly specialised branch of the scientific art.

The application of chemical methods to the identification of a person is largely a question of finger-prints or of the comparison of substances found upon his person with those associated with his habitat. In finger-print detection, as in other branches of the art of making evidence visible, exposure to vaporised iodine plays an important rôle. Once the chemist has made the finger-prints visible, his work on them is finished; he is not expected to be a finger-print expert. The examination of dusts, and particularly the interpretation of the analysis, is a matter involving considerable experience of places and trades.

The greater part of the book is devoted to the determination of the *corpus delicti* which involves ascertaining the nature of the crime or the manner of its commission. Stains, perhaps of blood, of paint, of mud, of the products of explosives, of decomposition, or of an infinity of other residues may figure largely in this examination. The forensic chemist must have a good deal of personal courage, too, and Mr. Rhodes aptly remarks that "the very greatest care should be taken in examining and handling an object suspected to be an unexploded bomb." He gives some useful advice upon this subject, which includes taking a radiograph of its contents before monkeying about with it. Chemical bombs have been a feature of recent I.R.A. activities. The chemical examination of questioned documents involves a discussion of the constitution of inks and their changes with age. Infra-red and ultra-violet photography, which are known to be most important aids to crime detection, are not considered by Mr. Rhodes as lying within the scope of the chemist, though in that we are not altogether in agreement with him. The use of invisible inks is a subject of considerable topicality in war time when spies are around us and fifth-columnists ply their nefarious trade in all countries. Counterfeit money has a chapter to itself.

Finally, there is an instructive chapter on the detection of the various toxic agents with which sudden death may be encompassed by the evilly-disposed. This book gives the reader a wholesome respect for the forensic chemist and his works, even though it cannot pretend to teach him the art of crime detection in the laboratory. Mr. Rhodes's counsel is for the chemist to stick to his craft and to call in an expert the instant he reaches the boundaries of his own special knowledge. In view of the care with which his evidence will be sifted in the courts this is very sound advice, even if it sounds to the industrial chemist a counsel of unattainable perfection. Certain it is that through the work of the forensic chemist: "Foul deeds will rise, Though all the earth o'erwhelm them, to men's eyes."

NOTES AND COMMENTS

The Second Budget

THE taxing proposals of the second Budget of the present financial year will fall severely on selected classes of individuals and a wide range of important trades. Still, Sir Kingsley Wood's speech left behind an uneasy feeling that he was budgeting from hand to mouth, and that the Treasury will be after the taxpayer again before next April. Income tax at 8s. 6d. in the pound is unprecedented, but it is the fact that a higher standard rate had been expected. The other increases broke no new ground, except the Purchase Tax which, though entirely remodelled, continues to show some objectionable features. Industrial chemicals, however, which are very far from coming into the category of luxuries, remain unaffected by its provisions. A Budget proposal which will affect every business in the land is the compulsory deduction at source of income tax from salaries and wages. This is what every firm already has to do with dividends, but that is a trifling matter compared with this vast new obligation. It will clearly mean a more expensive counting house, although from the national point of view it may lead to a prompter collection of the tax and a higher yeld. Sir Kingsley proved conclusively that what the Americans call " soaking the rich" would not provide nearly enough money to win the war. Seeing that the income of the nation as a whole is mounting rapidly with the stupendous increase of Government expenditure, the obvious alternative was boldly to tackle the question of a far greater direct contribution from the more prosperous wage-earners. Perhaps that is being kept in reserve for a third 1940-41 Budget on the lessons to be learnt from the compulsory deduction of income tax from wages at the source. The figures of the expanding gap between war expenditure and income are so far abnormal as to induce a public demand for drastic retrenchment in shamefully swollen Government establishments. Ministers are never tired of appealing to the individual citizen to save up to the hilt, while he hears one authenticated story after another of shocking waste in high quarters. Unhappily, Sir Kingsley only made perfunctory reference to this topic, but it is significant that it was the only passage in his speech that won a cheer from the House.

Registration and Definition of Chemists

BY means of a display advertisement in the National Press last Saturday, the Ministry of Labour and National Service intimated to all Chemists, Physicists, and Quantity Surveyors, falling within certain definitions, their obligation to enrol on the Central Register within five days. Those failing to comply with the Order will be subject on conviction to heavy penalty. The great majority of chemists have already enrolled on the Central Register, with the exception of those whom Professor Philip spoke of at the annual meeting of the S.C.I. earlier this month who had been discouraged from doing so, for one reason or another, by their employers. The great interest of the present Order, therefore, lies in the " definition given below," in which it is prescribed what a chemist is, within the intention of the Order. Chemists are here defined under four categories—Nos. 1 (a) to 1 (d) —all of which make the passing of an examination in chemistry obligatory, and, in addition, in the case of the lower standards of examination, a period of service ranging from two to five years is required. For a start, this is probably as good a method as any of sorting out the chemists; but there are undoubtedly many practical chemists working in the chemical industry who have not had the opportunity of passing the required examinations. It might be well, therefore, to set up machinery whereby these men also could be brought directly into the national service whenever they are required.

Physical Problems in Industry

IN order to assist professional men who in the present emergency find themselves presented with technical problems in applied physics of which they do not happen to have had previous first-hand experience, the Institute of Physics has decided to extend the facilities of its panel of consultants. Through this medium inquirers are put into touch with those physicists most likely to be able to offer immediate practical suggestions in any particular case. In the first instance, the contact is quite informal; subsequent arrangements are a matter for private agreement between those concerned. The subjects which can be dealt with cover all branches of physics, both pure and applied, including, for example, physical measurements and testing, the design and supply of scientific instruments for special purposes, and the control of processes by physical means. By acting as a clearing house in this way and supplementing existing official and unofficial organisations, it is hoped to help in the national effort by directing attention to existing solutions of difficulties which, while appearing to be new problems are often already well known in other fields. A typical example will serve to illustrate this point. A recent inquiry related to possible means of measuring the flow of certain animal secretions having complex physical properties, which prevented the use of more usual methods. It happens that certain printing inks have somewhat similar properties, and an informal introduction to a physicist in that industry has proved of great assistance. Inquiries about this scheme should be addressed to the Secretary of the Institute of Physics, the University, Reading, Berks.

The China Clay Industry

THE June shipments of china clay, etc., from Cornwall make it possible to estimate the effects of the war on the china clay industry. Shipping at Fowey, the principal port of exportation, was less than 20,000 tons, one of the lowest monthly totals on record, and 26,000 tons fewer than in June of last year. The total shipments for June were 40,556 tons compared with 71,766 tons for June, 1939. Shipments for the first six months of 1940 amounted to 307,256 tons of china clay, 7922 tons of china stone, and 13,047 tons of ball clay. These figures, when compared with the first half-year of 1939, viz: 368,943 tons of china clay, 19,499 tons of china stone, and 11,101 tons of ball clay, show a drop in the aggregate of 71,318 tons, a very serious loss. Before the last war Cornwall exported over a quarter of a millon tons of china clay products annually to America, but in consequence of the difficulty in securing shipping the United States embarked upon the development of their own clay deposits to the detriment of the Cornish industry. Since the last war china clay producers in this country have been developing the markets on the Continent with a large measure of success; even Germany was becoming a fairly large customer. Through the present European conflict several markets for Cornish clay have been suspended, and the industry is largely relying on home consumption for existence.

Organic Compounds for Industrial Heating

Characteristics of Diphenyl and Triphenyl Systems

by H. SEYMOUR

MUCH attention has been devoted lately to the uses of organic compounds as industrial heating media, and so much progress in this direction has been made that it is now possible to indicate the exact scope of this method. These compounds may be said to bridge the gap between high-pressure steam and mercury with alternative choice of either a liquid or a low-pressure vapour system. Their liquid properties are such that they may be used far below 450° F. in systems where water and steam may be objectionable because of possible scale-forming and pressure problems. The liquids leave no sludge or residue, while the low working pressures in these vapour systems require only the usual standards of design for low or moderate steam pressures.

One such compound has been developed for, and successfully applied to, both liquid and vapour heating systems, covering the temperature range from as low as 60° F. up to 750° F. It boils at 500° F. at atmospheric pressure, and at the highest recommended service temperature, 750° F., produces a vapour pressure of only 135 lbs./sq. in. gauge. This compound is an eutectic mixture of the organic compounds, diphenyl and diphenyloxide. It is liquid at ordinary room temperatures, freezing at 53.6° F., as distinguished from its components diphenyl, which freezes at 154° F., and diphenyl-oxide, which freezes at 80° F. The composition of the mixture is diphenyl $[(C_6H_5)_2]$ 26½ per cent., and diphenyloxide $[(C_6H_5)_2O]$ 73½ per cent.

Neither the liquid nor the vapour of this compound is toxic in character. No more precautions need be observed in its use than would be necessary with any other hot fluid or vapour at equivalent temperatures. It possesses the characteristic odour of diphenyloxide (similar to that of geranium), which quickly gives warning of any leaks in a system. Prolonged exposure to its vapours from neglected leaks may, in some cases, cause slight nausea which is relieved when the cause is removed. The material is very stable at all service temperatures and leaves no carbon or sludge deposits on heat-exchange surfaces. Moreover, neither corrosion nor oxidation results from its use either as a liquid or a vapour. As a result, almost any metal commonly used at the desired service temperatures can be employed with this compound. Cast iron is excepted because of possible leakage through porous castings due to the extremely low viscosity of the compound.

Explosion Risk Negligible

Although inflammable, the compound is not considered particularly dangerous, as the possibility of explosion of either the liquid or the vapour is negligible. The liquid has a flash-point of about 215° F., but cannot support its own combustion at this temperature. It has been shown that a leak from a vapour system into a furnace compartment would result only in a burning of the vapours, as the normal percentage of carbon dioxide in the combustion gases would not permit the formation of an explosive mixture. Above 800° F., the vapours of this compound cannot possibly explode, as this is the upper temperature limit for explosion. The gas temperatures in boiler units are, in general, well above this limit. The low liquid viscosities of the compound permit high circulating velocities with low resultant pressure losses. This fact allows high rates of heat transfer and the use of a small quantity of fluid in the circulating system.

For temperatures between 300° and 650° F., where it is desirable to use a liquid heating system at atmospheric pressure, another compound has proved satisfactory. The upper temperature limit may be extended to about 800° F., without appreciable decomposition, where the system is operated at pressures slightly above atmospheric. The useful range of this second compound overlaps that of the first in the range between 300° and 490° F. This second liquid consists mainly of the different chemical isomers of triphenyl $[(C_6H_5)_3]$, with small quantities of related high-boiling compounds which serve to reduce its freezing point. It has a softening point of 70° F., but is not completely melted until it reaches a temperature of 270° F. The approximate boiling range is 600-800° F. at atmospheric pressure. As it contracts upon freezing, no harm can result from hardening in a cold system. Such a system can quickly be thawed out by the application of steam or hot water heat. As in the case of the first liquid, both the liquid and vapour of the second are non-toxic. If any should accidentally get into the eye or mouth, the only result is a slight burning sensation for about twenty minutes, somewhat similar to the effect of paraffin. The non-corrosive properties of this compound make possible its use in any satisfactory structural metal. When maintained at temperatures close to the upper limit for long periods of time, some slight change in composition can be noticed, but the resultant products are non-corrosive liquids which do not harm the material or the system.

Heat-Transfer Applications

The application of these compounds need not be confined to the replacement of high-pressure steam alone. The ease with which they are adaptable for heat-transfer purposes suggests their use in a great many fields. Among the many successful applications are large installations for both the generation and superheating of steam; central-heating plants with a distribution system to various pieces of equipment; individual heating and cooling units for chemical reactors; heat-storage systems for use in off-peak periods; jacketed reactors and kettles, and high-temperature dryer jackets. Some manufacturing plants have installed supplementary boilers for using these compounds in order to avoid the expense of steam boilers rated over 100 lb. pressure. In fact, the first liquid mentioned has found applications in many plants that have hitherto had steam available for heating purposes only.

The use of these compounds to remove waste heat has not been overlooked. They are just as effective in cooling as they are in heating. In a number of instances steam has been generated for plant use from the waste heat of a process in which either compound was the cooling medium.

Among the numerous possible applications of the compounds to the several process industries may be included moulding of plastics and rubber products; refining of petroleum products and vegetable oils; melting of solders and other low-melting-point metals; tin-plating and similar operations; control of chemical reactions; processing of food products; evaporators and vacuum pans; linoleum manufacture; and heat-processing of paints and varnishes.

Decomposition Temperatures

The ability of these compounds to withstand high temperatures with only negligible decomposition has been conclusively demonstrated by rigid laboratory and long-period plant tests. Some decomposition may be expected with either material when they are operated near their maximum recommended service temperatures. In general, it can be said that about 700-750° F. measurable decomposition does occur, and constant operation at these temperatures would involve periodic re-purification of the material with the addition of a small percentage of new fluid. The second compound will show practically no decomposition up to 650° F. Between 650° and 800° F. some fraction of its lower boiling components will distil out of the mixture, leaving a more stable fluid as the

only result. When the compounds are heated much in excess of their recommended service temperature for any appreciable length of time, their decomposition will result in tar and carbon formation.

The two methods of purifying the first compound are crystallisation and distillation. The crystallisation process requires the least equipment, but some material may be lost by using it. The liquid is drawn off into crystallising pans and allowed to cool. When cooled below the melting point of the pure material, the crystals of the purified compound may be separated from the decomposition products that remain in the liquid state.

Construction and Care of Plant

The handling of these vapours and liquids in pipes and vessels involves somewhat more care in construction of connections and joints to ensure permanent tightness than would be required for the corresponding pressures with steam and water. This is due to the low surface tensions and low viscosities of the compounds, especially at temperatures above 400° F. For these reasons welded construction is superior to riveting and is recommended wherever possible. Rolling of tubes into headers or tube sheets is properly cared for, and scale, rust, and other foreign materials are carefully removed from tube ends and headers before rolling. Piping construction should follow the best high-temperature practice. Screwed joints are satisfactory for pipe sizes of $\frac{3}{4}$ in. and smaller, but extreme care should be taken to see that perfectly cut threads are secured. Flanged joints, with the flanges welded to the pipes and joined with soft metal gaskets, are the most satisfactory. Ordinary all-steel valves fitted with high temperature trim material and extra deep stuffing boxes are satisfactory. Safety and relief valves of types used for high-temperature oil-still service should be used. All places requiring packing, such as stuffing boxes on pump shafts, should be made extra deep and only the best grades of high-temperature packing used. It is recommended that safety and relief valves be set considerably above the normal working pressure. This minimises the possibility of loss of compound due to safety-valve discharge. In some cases, to prevent loss of material, it may be desirable to provide for condensing the discharge from safety valves. In this connection it should always be remembered that the first liquid freezes at 54° F., and extreme care should therefore be taken to prevent lowering of the temperature to a point where stoppage of the outlet piping could take place.

In the selection of pumping equipment for condensate return, liquid circulation, etc., positive displacement and gear type pumps are unsatisfactory because of their dependence on the compound for lubrication of some parts. Centrifugal pumps, when properly designed and fitted for the temperature involved, will give good results. These pumps should have the special features provided for in hot-oil pumps, such as cast steel casings, nitralloy shaft sleeves and sealing rings, extra deep, water-cooled, stuffing boxes, and bearings well removed from the high-temperature zone. For installations where the pump does not encounter temperatures of more than about 450° F., a vertical, submerged-type, centrifugal pump having a cast iron housing has been used successfully.

Care should be taken that these compounds are not used in boilers or other heating apparatus which contain soft or fusible plugs such as are often used in small fire-tube steam boilers to protect against low water. These would be almost certain to melt out, causing loss of compound and possible fire.

The ordinary method of testing apparatus to be used with steam is that of introducing cold water into the systems under pressure. This is not satisfactory for systems in which these compounds are to be used inasmuch as apparatus that will prove to be perfectly tight with the cold-water test may leak extensively with the hot compounds. The most satisfactory test is to introduce ammonia gas into the system up to about 1 lb. pressure and then apply air pressure to within about 50 per cent. of the pressure capacity of the system. If leaks are present they may be detected by applying a lighted sulphur candle or dilute hdrochloric acid swab, a white fog resulting wherever a leak occurs. If ammonia gas is not available, an alternative test would be to fill the system up to about half the volume with ordinary ammonia water and complete the test as described above. Ammonia will do no harm to the system.

The cost of heat generated in the form of this organic compound vapour, as in the case of steam, will naturally be subject to variables such as local fuel costs and methods of operation. Since, in most systems employing the first compound, the working temperature will be at least 700° F., it follows that heat losses through stack gas necessarily must be rather high. It would be difficult to remedy this situation if the condensate were returned to the boiler without being cooled much below the boiling point, because an economiser section on the boiler would not be very effective. However, where fuel cost and size of installation justify it, air preheaters can be used and stack gas temperatures brought down to fairly low levels. It may be said that thermal efficiencies of 60 to 65 per cent. may be expected with such boilers where air preheating is not employed and 70 per cent. or better where air preheating is used, depending, of course, upon the size of the installation and the degree of preheat.

Phthalic Anhydride*

Purification by the Sulphuric Acid Method

IMPURITIES likely to be present in the crude phthalic anhydride formed in the vapour phase oxidation of naphthalene include maleic anhydride, benzoic acid quinones, naphthols and phthaleins. Sublimation of the crude product only results in partial purification owing to simultaneous sublimation of a number of impurities. In an early process of the Kuhlmann concern (F.P. 648,163) toluol and xylol were proposed as selective solvents, phthalic anhydride itself being only slightly soluble in the cold. Carbon tetrachloride is also reported to be a satisfactory recrystallising medium for crude phthalic anhydride (U.S.P. 1,301,388, of Conover and Gibbs). Later it was found that purification could be effected by treatment with an aldehyde (*e.g.*, hot trioxymethylene) followed by distillation and sublimation (E.P. 361,433, Monsanto).

In the improved method of purification now put forward, which is actually a development of the technique of H. B. Foster (U.S.P. 2,105,911 and 2,105,918), the crude product from a typical modern large-scale plant is subjected to prolonged treatment with hot sulphuric acid or another substance containing an SO_3 group, and finally distilled or sublimed. The apparatus consists of a three-necked still provided with condenser, stirrer and thermometer. With the addition of 3-5 per cent. of 66° Bé. sulphuric acid the crude anhydride is stirred at 180° C. for several hours until all the water and naphthalene are eliminated (anything up to 25 per cent. naphthalene may be present). The mass is then held at 250° C. for about 2 hours, when the temperature of the vapours gradually rises to 285° C. (the boiling point of pure phthalic anhydride). Heating is then interrupted, the excess sulphuric acid removed by neutralisation or, preferably, by treatment with activated carbon, and the pure anhydride isolated by distillation or sublimation. This gives a white product melting at 130.5-131° C. and sufficiently pure for conversion into anthraquinone dyes or synthetic resins. It does not change colour when exposed for weeks to sunlight in the open air. The chemical breakdown of impurities by the sulphuric acid is accompanied by a certain degree of carbonisation, as revealed by the residue of coke in the still after distillation of the pure material. An exceptionally pure and odourless phthalic anhydride may be obtained by carrying out the distillation under reduced pressure (20 mm. mercury).

* A. Spada, Ann. Chim. Appl., April, 1940.

Allyl Alcohol

Its Derivatives and their Uses

IN the synthesis of glycerine from propylene, a process now brought to the commercial stage in the U.S.A. by the Shell interests, allyl chloride is obtained as an intermediate product and can be readily converted into allyl alcohol. The Shell Development Co. effect this conversion by treating the chloride with water and a metallic base under pressure. The I.G. have been working along similar lines. One incidental result of the successful production of glycerine by synthesis is, therefore, the availability of a plentiful supply of cheap allyl compounds. Although allyl alcohol itself is not directly of interest to industrial users on account of its irritant and lachrymatory character and its repulsive odour, many of its derivatives merit increasing attention.

Several allyl derivatives have already been used in medicine. Diallyl barbituric acid (dial) is sometimes used in place of veronal (diethyl barbituric acid); allyl *p*-acetaminophenol has been proposed in conjunction with dial as a remedy for epilepsy. Allyl ethers have been examined for their anaesthetic value, but the results were discouraging: allyl ethyl ether and diallyl ether were inferior to ordinary ether. Allyl camphor has been prepared from allyl chloride and camphor.

Pungent Odour of Natural Compounds

Several naturally occurring allyl compounds are familiar from their pungent odour. Allyl isothiocyanate occurs in mustard oil and horseradish; diallyl sulphide is a principal constituent of the oil extracted from garlic bulbs. Only moderate interest has been aroused by allyl derivatives in the perfume industry. Allyl salicylate (b.p. 247° C.) has a floral and fruity odour which has suggested its use as a modifying agent for flower perfumes. Diallyl malonate also has a distinctive fruity odour but does not appear to have been exploited. Some years ago the French chemists, Schving and Sabetay, used allyl alcohol to prepare mixed esters of a series of well-known perfumery alcohols, including phenyl ethyl alcohol, linalyl alcohol and geranyl alcohol.

Allyl acetate (b.p. 103-4° C.), allyl oxalate (b.p. 217° C.) and other esters can be readily prepared by direct esterification of the corresponding acids with anhydrous allyl alcohol. Allyl levulinate is a liquid boiling at 133-6° C. (40 mm.). Many of these esters should be of interest as solvents or plasticisers. Allyl acrylate was put forward many years ago (when both allyl alcohol and acrylic acid were prohibitive in price) as a solvent for the production of combined rubber-cellulose ester lacquers and plastics. It boils at about 120° C. and should contain an inhibitor if it is intended for use as a solvent, owing to its polymerising tendency. Allyl glycols have been prepared from allyl bromide and esters of dicarboxylic acid, e.g., tetraallyl tetramethylene glycol from diethyl succinate; tetraallyl butylene glycol from diethyl oxalate; tetraallyl pentamethylene glycol from diethyl glutarate.

The rapidly expanding plastics industry has taken note of the properties of resins formed by polymerisation of certain allyl esters, although it is impossible to say whether they have been exploited on any considerable scale. Diallyl fumarate slowly polymerises to a colourless, rubber-like mass; when copolymerised with vinyl acetate it gives a hard, infusible resin. Diallyl sebacate polymerises to a pale-yellow gel. Triallyl phosphate copolymerises with styrene to an almost insoluble colourless resin. Copolymers are also formed by styrene when polymerised in admixture with allyl maleate or allyl methacrylate. These resins are reported to have exceptional insulating value for television cables. Allyl esters (as well as allyl chloride) have been copolymerised with vinylidene chloride to form useful resins. Finally it may be noted that allyl alcohol can be oxidised to acrolein in good yield (F.P. 788,921) and the latter in turn can be used as starting point for production of the very important acrylic ester resins.

Brazilian Diatomite

High Silica Content

DEPOSITS of diatomite in Brazil, states the *Bulletin of the Imperial Institute* (1940, *38*, 2, 238), have been exploited for a number of years, an interesting example being that, without knowing the precise nature of the raw material being used, the town of Fortaleza, capital of the State of Ceará, in N.E. Brazil, has been almost entirely constructed with lightweight diatomite bricks. Brazil is, therefore, unique among tropical countries in having a high proportion of thermally-insulated buildings, even though this usage was originally fortuitous.

The principal Brazilian deposits, occurring in several provinces, are found in lagoons or fens among sand-dunes, and, particularly in the littoral belt, may be permanently or intermittently under water. Altogether, many millions of tons of diatomite are believed to be available, and as the local fabrication of lightweight bricks consumes about 100,000 tons annually, a supply is ensured for a considerable number of years to come.

In Pernambuco a diatomite product with over 94 per cent. of silica has been obtained, but this is considerably higher than the average silica content of the diatomite from the N.E. part of the country. Chemical analyses show that in the raw material the silica content ranges from 51.7 to 88.2 per cent., but in view of the usual mode of occurrence of the deposits it is not surprising to find that there is a comparatively high content of moisture and volatile material resulting in a high loss upon igniting the raw material. Ignition losses up to 27.4 per cent. and humidity losses up to 8.8 per cent. have been recorded in this way. Upon air-drying and calcining, therefore, an appreciable beneficiation as regards silica content takes place. Hence, Brazilian diatomite compares quite favourably in silica content with many diatomites from other parts of the world, but its alumina content is frequently quite high, and in places the material is essentially of the nature of a clay-with-diatoms.

BRITISH FINE CHEMICALS

The Association of British Chemical Manufacturers has issued a new list and directory of British Fine Chemicals produced by members of the Association. Dated April, 1940, it supersedes the previous list of April, 1935, and should be of the greatest value to research chemists and other users of fine chemicals. The list is comprehensive, but does not claim to be exhaustive, as chemicals in very infrequent demand are not included. Most of the chemicals listed can be obtained at short notice from the manufacturers, whose names and addresses are fully indexed. The publication is distributed gratis to bona-fide users of fine chemicals, but only on direct application by them to the offices of the Association, 166 Piccadilly, London, W.1.

EXPORT GROUPS FORMED

The formation of the following Export Groups is notified in the *Board of Trade Journal* of July 18: Fire Extinguisher Trades (Chairman, Mr. H. B. Graham; secretary, Mr. E. S. Howard), 6 Martin Lane, Cannon Street, London, E.C.4; Glue, Gelatine and Allied Trades (Chairman, Mr. R. Duncalfe; secretary, Mr. H. Kidson), 52 Lincoln's Inn Fields, London, W.C.2; High Conductivity Copper and Alloys (Chairman, Mr. A. L. Johnson; secretary, Mr. A. M. Kennedy, M.C.), 52-54 High Holborn, London, W.C.2; Magnesia (Chairman, Mr. R. J. Raeside; secretary, Mr. P. R. Prescott), The Washington Chemical Company, Washington Station, Co. Durham; Paint, Ink and Allied Trades Machinery Manufacturers (Chairman, Mr. C. E. Carruthers; secretary, Mr. J. T. Burslem), 69 Penn Lea Road, Bath.

Recent Trade Literature

The summer edition of *Smokeless Air*, the journal of the NATIONAL SMOKE ABATEMENT SOCIETY, includes a report of a paper on the production of reactive gas coke by alkali activation. There is also a report of an American paper on air pollution and disease.

The Minister of Labour and of National Service's decision to set up communal canteens to facilitate the feeding of the great mass of men and women in vital war industries lends a topical note to a booklet issued by the BRITISH COMMERCIAL GAS ASSOCIATION. This deals with canteens for the forces and factories and includes illustrated descriptions of several works canteens.

In place of a ninth annual report the BRITISH COLOUR COUNCIL has published a brochure entitled "Ten Years of Achievement." This is a record of the Council's achievements to date and lists developments year by year commencing with the formation of the Council in 1930. Still more recently the Council has issued charts illustrating the principal dress colours for autumn and winter, 1940-41.

Further literature dealing with "Mopump" units has been issued by RHODES, BRYDON AND YOUATT, LTD., the manufacturers. A leaflet describing these appliances was noticed in THE CHEMICAL AGE (May 25, 1940, p. 295). The latest booklet considerably amplifies the previous information. In addition, whereas the first reference dealt only with small vertical units, horizontal units are now described. Reference is also made to various specialised forms of "Mopumps."

New apparatus for the laboratory is described in a brochure issued recently by A. GALLENKAMP AND CO., LTD. Among the appliances described are the A.L. British metallurgical moulding press for use in the mounting of small metallurgical specimens in Bakelite, the Conway micro-burette which is a modification of the original Conway horizontal micro-burette, the Oertling No. 62 aperiodic prismatic-reflecting chemical balance with "Multiweight" device which has a capacity of 100 grams and which, with the "Multiweight" device in combination with the prismatic-reflecting device makes weighing fully automatic up to 0.9999 gram, and Fletchers' new pattern laboratory Bunsen burners. Mention is made also of an apparatus for measuring the efficiency of "wetting" agents in connection with research on textiles. This apparatus was developed in the Department of Chemical Technology, Bombay University.

The normal course of education has unavoidably been disturbed in these times. There are, however, certain items of improved apparatus useful to students that have been developed since the outbreak of war. The use of improved apparatus is an important economy. GRIFFIN AND TATLOCK, LTD., have issued several pamphlets describing some interesting new productions. Among them are the Microid gas calorimeter which has been designed in accordance with the recommendation in the 1936 report of the Science Masters' Association that determination of calorific value should find a place in the science curriculum. The apparatus is readily set up. Corrections may be introduced for scholarship form work. Leaflet GT. 1305 describes two interesting new devices. The micrometer spherometer is a new type, utilising a standard micrometer, made to high precision engineering standards. The Brownian motion apparatus is easily set up and strikingly illustrates the kinetic theory of gases. Griffin and Tatlock have also issued details of the Microid gas generator which is easy to fill and recharge, contains no ground glass joints and delivers gas up to a pressure of 18 cm. water. It has, it is stated, entirely displaced the Kipp's apparatus imported in pre-war days from Germany. Mention is also made of the Carbanalyser, a new instrument operating on a magnetic principle. It allows a complete carbon determination, accurate to 0.02 per cent., in from 3.4 minutes.

A recent issue of *The Reflector*, published by the BENJAMIN ELECTRIC, LTD., contains interesting examples of the use of Benjamin reflectors in industrial spheres, including those at factories of Imperial Chemical Industries, Ltd., and Boots Pure Drug Co., Ltd.

The July issue of "Oxy-Acetylene Tips," published by the LINDE AIR PRODUCTS CO., New York, is notable for a number of interesting articles. These include details of how bronze-welding saves costs in gas plant maintenance and a description of how to build and operate a machine for cutting and bevelling pipe.

New vacuum pumps capable of creating a vacuum of within two inches of the barometer are described in a leaflet issued by B.E.N. PATENTS, LTD. These machines are said to be suitable for a great variety of industrial applications such as sealing and capping machinery, pump priming, die-casting machines, and other uses where dry vacuum is required. Motor-driven vee-belt units are available with or without vacuum vessels. The pumps are available in single and multi-cylinder types, displacing 1.5 to 41 cu. ft. per minute.

THE LINCOLN ELECTRIC CO., LTD., have published an interesting booklet entitled "101 Welding Ideas for Low-Cost Maintenance." Its publication is particularly valuable at the present time when the repair and maintenance of machinery and engineering equipment has assumed tremendous importance and when spare parts are difficult to obtain and every machine must be kept working to full capacity. The booklet draws attention to the fact that the maintenance departments of companies are finding the electric arc a tool of great assistance.

An interesting booklet on Calgon (sodium metaphosphate) and its industrial applications has been issued by KEITH PIERCY, LTD. This booklet is a temporary war-time production to replace the general Calgon booklet which is now out of print. The properties of metaphosphate are described briefly and some of the ways in which it is being used are indicated. Recent developments have widened the scope of Calgon and important uses have been found for it by a wide range of industries, including steel works, paper mills, oil wells and refineries, soap works, and chemical and glass works.

Mineral jigs manufactured by the DENVER EQUIPMENT CO., LTD., are described in a brochure issued by the company. These jigs, which operate on the basic principle of hindered settling, are used on practically every type of ore ranging from massive sulphide to others low in mineral ratio, and some which are completely oxidised. The company have issued also details of Denver horizontal crushing rolls, the principle of which is to crush the material once and to discharge it immediately, thereby enabling fine material to be removed and only the oversize material to be returned for additional grinding.

The Babcock fuel sampler which is described in a leaflet issued by GRIFFIN AND TATLOCK, LTD., is said to be an improved apparatus for use in the accurate reduction of coal and other crushed and powdered samples for analysis. The principle applied in the design of the sampler, which has been in constant use for many years in the fuel section of the research department of Babcock and Wilcox, Ltd., is based on the discovery that the most convenient method of uniform selection of samples for analysis is to allow crushed coal to run in a thin stream from a hopper and to take a large number of small increments from every portion of the cross-section of the stream. The sample to be subdivided is placed in a hopper mounted above an electrically driven turntable, which carries twelve triangular receivers, arranged in a circle. The speed of rotation is about 60 r.p.m. If it takes five minutes for the coal to run out of the hopper, the sample in each receiver will have been made up from no fewer than 300 increments.

Commercial Sodium Chlorite

Its Properties, Hazards and Uses

A STUDY of the properties and reactions of sodium chlorite is reported by M. C. Taylor, J. F. White, G. P. Vincent and G. L. Cunningham, of Mathieson Alkali Works, New York, in *Ind. Eng. Chem.*, 1940, *32*, 7, 899-901.

Sodium chlorite, comparatively new as a commercial chemical, is used in bleaching paper pulp as well as textiles; it is a convenient source of pure chlorine dioxide, which is useful in pulp and flour bleaching; and, according to Diénert, it appears to have a further use in water purification. It may exist in two solid forms, the anhydrous ($NaClO_2$) and the trihydrate ($NaClO_2.3H_2O$). The anhydrous material is the more practical for industrial use; it is not hygroscopic, does not seriously cake in storage, and has the higher content of active oxygen in proportion to weight.

The property of sodium chlorite on which its most important industrial uses are based is its oxidising power. In cold alkaline solutions it has a mild oxidising action, but heating or acidification both develop a strong oxidising condition, even at temperatures only slightly above normal and at *p*H values of 3 to 5, under which conditions most materials requiring bleaching are resistant to harmful attack. Sodium chlorite is a much stronger oxidising agent than the peroxide, and is also stronger than the chlorate in dilute acid solutions. It should be of value in organic oxidations where it is desired to operate in slightly acid aqueous solutions with careful control—*e.g.*, by adjusting the temperature or *p*H.

Stability tests were applied, and the storage stability over a period of one year was found to be excellent, both for the commercial and purified grades. Stability tests at high temperatures showed that a sample containing 79 per cent. $NaClO_2$ by weight started to decompose at 175° C., mainly according to the equation $3NaClO_2 \rightarrow 2NaClO_3 + NaCl$. Less than 5 per cent. evolved oxygen on decomposition ($NaClO_2 \rightarrow NaCl + O_2$).

Explosion and Combustion Risks

In the presence of organic matter the balance between these two reactions is disturbed, and copious evolution of oxygen takes place so that the chlorite aids combustion. A mixture of sugar and sodium chlorite in a crucible burst into flame at about 200° C. G. R. Levi (*Gazz. Chim. Ital.*, 1922, *52*, 417) stated that sodium chlorite explodes upon percussion. This has been investigated by placing a portion of sodium chlorite upon an anvil and striking it with a hammer. Explosion will result unless the face of the hammer and anvil have been freed from the film of grease usually present on such tools. When both the hammer and anvil are clean, there is no explosion when the chlorite is struck. The addition of a trace of oil or grease will ensure explosion. Less adherent organic matter will probably, but not always, cause explosion when the mixture is struck. Fire hazards, similar to those with sodium chlorate, arise when sodium chlorite solutions are allowed to dry on clothing, and the use of cotton gloves in handling chlorite should be avoided. A mixture of sulphur and solid chlorite will ignite if rubbed or slightly moistened. There is enough sulphur in a rubber stopper to cause a slight pop when rubbed on moist chlorite; the use of neoprene avoids this danger, but bottles containing chlorite should generally be closed with glass or cork stoppers.

Concentrated strong acids should not be allowed to come into contact with sodium chlorite, as the irritant gas, chlorine dioxide, can be evolved. This has, however, a noticeable colour and odour in low concentrations in the atmosphere. Adequate ventilation and gas masks should be provided wherever there is a possibility of men coming into contact with an atmosphere containing chlorine dioxide.

Cunningham and Losch (U.S.P. 2,043,284, to Mathieson Alkali Works) discovered that when chlorine is passed into strong solutions of sodium chlorite, chlorine dioxide is formed according to the equation: $2NaClO_2 + Cl_2 \rightarrow 2NaCl + 2ClO_2$.

If the chlorine dioxide is removed as formed—for instance, by aëration—the efficiency of its production is high. Under these conditions chlorine dioxide equivalent to over 97 per cent. of the chlorine decomposing is removed from the solution. The reaction is rapid and the rate of generation can be controlled by adjusting the rate of introduction of the gaseous chlorine. However, if the chlorine dioxide is not removed as formed, it will dissolve in the generating solution to such an extent as to produce a dark red solution. Under these conditions chlorate may be formed equivalent to as much as 30 per cent. of the chlorite decomposed in the case of strong solutions. It would appear that in the reaction of chlorite with chlorine or hypochlorite, acid conditions favour the formation of chlorine dioxide while alkaline conditions tend to produce chlorate. In solutions whose *p*H is above about 11 to 12, sodium chlorite reacts with sodium hypochlorite as follows: $NaClO_2 + NaClO \rightarrow NaClO_3 + NaCl$.

Industrial Uses

By using sodium chlorite kraft pulp can be bleached to a high white without loss of strength. A similar degree of whiteness cannot be obtained by known processes using hypochlorite without loss of strength. In practice, the pulp purification process is usually carried as far as possible without damage, using chlorine and hypochlorite; then the chlorite bleaching process is applied to finish the pulp to a high white while preserving strength. In textile mills the chlorite is finding its use in the bleaching and finishing of cotton and rayon. It is commonly used in acid conditions along with a detergent to obtain scouring and bleaching in one step. It is also employed under extreme alkaline conditions at high temperature in the kiering operation, where it is effective in starch and mote removal and simplifies finishing operations

A chemically pure grade of sodium chlorite is available and has been used as an analytical reagent by Jackson and Parsons (*Ind. Eng. Chem., Anal. Ed.*, 1937, *9*, 14) in the determination of sulphur compounds in pulping liquors and by Yntema and Fleming (Ibid., 1939, *11*, 375) in analysis for iodides.

American Synthetic Rubber

Butyl Rubber Manufacture

SOME further details concerning "butyl rubber," the American synthetic product made from petroleum by the Standard Oil Co., of New Jersey, were given by the chairman, Mr. W. S. Farish, at the recent annual general meeting of the company. Contrasting the material with "buna" the companion product produced by I. G. Farbenindustrie in Germany, Mr. Farish explained that the latter originated from limestone and coal, the cheap raw materials of Germany, but that in the company's plant at Baton Rouge, Louisiana, the starting material would be petroleum. Butyl rubber was produced from petroleum by processes more simple and direct than those required for the production of buna. Although its manufacture involved the most advanced technology, they had solved successfully the primary production problem and had already in operation a semi-commercial pilot plant at Bayway, N.J. The butyl rubber was not an oil-resistant rubber and would therefore not be in direct competition with buna for the speciality markets. The butyl rubber had, however, special properties of its own which made it superior to natural rubber for many processes. Its commercial development would be made by stages, the first being the manufacture of relatively small quantities for the speciality market and for commercial testing in tyre production. Mr. Farish also revealed that the company owned the patents for the production of buna and butyl rubber for the United States and the British and French empires.

Personal Notes

MR. C. W. TAYLOR has left Albert Products, Ltd., of Erith, Kent, where he has been works manager since 1934.

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The Minister of Aircraft Production has appointed MR. KENNETH LAYTON-BENNETT chairman of a committee which deals with the collecting, sorting, melting and refining of aluminium gifts received by the Ministry.

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MR. J. G. CHALMERS, B.Sc., A.I.C., has been awarded a Fourth Year Fellowship of £500 a year by the Beit Memorial Trust to continue his chemical studies of polycyclic hydrocarbons in experimental cancer formation at the Research Department of the Glasgow Royal Cancer Hospital.

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MR. A. D. DAYSH has been elected to the Board of Monsanto Chemicals, Ltd. This appointment is the culmination of twenty years' association with his firm. For many years he was manager of the London office of Monsanto, and for the past seven years he has been Monsanto's sales manager.

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MR. F. J. HAMBLY, F.C.I.C., was awarded the Society of Chemical Industry (Canada) Medal at the recent Seigniory Club Convention of the Canadian chemical industry at Ottawa. Mr. Hambly was born in 1868 at Plymouth, England, and after teaching in the chemistry departments of University College, Dundee and Robert Gordon College, Aberdeen, he went to Canada in 1898 as chemist to the newly-formed Electric Reduction Co., of Buckingham, Que., of which he became managing director in 1928 and president in 1935. In his talk following the award of the medal, he reviewed the development of the Canadian chemical industry, coupled with his long experience in the manufacture of phosphorus and ferro alloys.

OBITUARY

MR. F. F. WHEELER, who was technical representative of Shell-Mex and B.P., Ltd., at their Southampton branch, has been killed in action while serving with the R.N.V.R.

Chemical Matters in Parliament

Potato Flour

COLONEL BURTON, in the House of Commons last week, asked the Parliamentary Secretary to the Ministry of Food whether he had considered the question of producing potato flour in this country to eke out the cereal product; where were any factories in the kingdom which were capable of doing this service; and whether they were now so employed.

Mr. Boothby replied that the matter had been the subject of of very full consideration. There were two factories now in existence, one at Wisbech and the other at Skelmersdale, which were capable of manufacturing that product, and four additional factories now in course of erection were being equipped with the necessary machinery for the purpose. They were not at the moment employed in producing potato flour, as at this season of the year there were no potatoes suitable for this form of processing.

Silicosis and Asbestosis

In answer to questions by Mr. Ellis Smith and Sir Francis Fremantle concerning what steps were being taken to deal with silicosis and asbestosis, Sir John Anderson replied that provision was made in the Silicosis and Asbestosis (Medical Arrangements) Scheme for periodic examinations of workmen in ganister mines and in silica processes in the pottery and asbestos industries with a view to the early detection of the disease and, except in certain cases where undue hardship might result, for the removal from these processes of workers found to be affected by it. As regards coal mines, the question was investigated by the Royal Commission on Safety in Coal Mines, but the Commission did not feel at that time that they could usefully recommend the institution of such examinations in the case of persons employed in coal mines.

Vitamin B1 in Bread

In the debate on Supply in the House of Commons last week Mr. Boothby (Parliamentary Secretary to the Ministry of Food) explained that the Government intended to overcome the main objection to stored white flour—that it was lacking in the vitamin content of wholemeal flour—by fortifying the white flour with vitamin B1. In addition they had decided to introduce into the loaf a small quantity of calcium salt. The public would be given a choice of fortified white bread or wholemeal bread at the same price, and each consumer would be free to purchase bread of one kind or another. This was an unprecedented and indeed a revolutionary step from the nutritional point of view. The decision to fortify white bread with vitamin B1 was taken after receiving a report on the subject from the Scientific Food Committee under the chairmanship of Sir William Bragg.

New Control Orders

Pyrites Control

THE Control of Pyrites (No. 1) Order makes the Minister of Supply the sole purchaser of pyrites produced in the United Kingdom. Any communication on this subject should be addressed to the Controller of Sulphuric Acid, Ministry of Supply, 19 Berkeley Square, Bristol, 8.

Magnesium

The Minister of Aircraft Production has made an Order, which came into force on July 23, providing that magnesium and magnesium alloys (whether unfabricated or in the form of billet, block, powder, slab or stick) shall not be bought, sold or used except under licence.

Exclusions from "Non-Essentials"

Ferro-prussiate, ferro-gallic and dyeline papers (from Class 12) are among the goods now excluded from the list of "non-essential" goods, the sale of which to retailers and the general public is restricted. These deletions are made in the Limitations of Supplies (Miscellaneous) (No. 3) Order, issued by the Board of Trade on Thursday. Other goods excluded from the list are stoneware and containers of pottery and clay, and industrial gloves of all materials.

Industrial Spectroscopy

Consultative Body Suggested

DISCUSSION of the applications of spectroscopy to industry is the subject of an interesting suggestion made by Mr. F. Twyman, F.R.S., formerly English editor of *Spectrochimica Acta*. Industrial applications, he says, are at present confined chiefly to spectrographic analysis by emission spectra, but the industrial importance of absorption spectrography is increasing, and this, therefore, might be included. In order to further the reading and discussion of papers, he makes the following alternative proposals:—

(1) That some body, like the Non-Ferrous Metals Research Association, be asked to appoint a committee to consider the advisability of establishing a Spectrochemical Society.

(2) That the Society of Chemical Industry be approached with a request that it should appoint a Committee to consider establishing a Section devoted to industrial spectroscopy. If either of these proposals appeals to chemists, he would be glad to act as a channel for the purpose of putting the suggestions before the bodies mentioned. Any other suggestions on the subject from our readers would be welcome.

General News——From Week to Week

WORLD OUTPUT OF COBALT for 1939 is estimated at about 6000 metric tons, as against 4500 in 1938. A sharp increase in Rhodesian output accounted for the difference.

TEN THOUSAND STEELWORKERS in Lanarkshire and other parts of Scotland received a further wage increase of 3s. 2d. a shift on July 19, following the cost of living increase.

AIR MINISTRY SPECIFICATION D.T.D. 268A for 55—65-ton chromium-molybdenum steel, suitable for nitrogen hardening, which supersedes D.T.D. 286, is now available from H.M. Stationery Office, price 1s. (1s. 1d. post free).

MR. HOGG, OF COURTAULDS, LTD., addressing a meeting in London recently, said that all the nylon fibre used in this country during the war would be for direct war purposes only. There would be no material left over for the civilian textile trades.

THE IODINE EDUCATIONAL BUREAU, Stone House, Bishopsgate, E.C.2, has published a handy leaflet-chart, to be affixed in air-raid shelters and the like, giving a brief summary of the first-aid uses of iodine, and the method of employing it for the sterilisation of suspected drinking water.

THE NATIONAL SAFETY FIRST ASSOCIATION has performed a useful service to the thousands of new workers now coming into industry by publishing a short booklet on works safety. It is entitled "We don't want to lose you" and goes on "So we think you ought to know." Basic ideas on safety in the factory are outlined briefly in the text and pointed by humorous drawings by Mendoza. Sample copies of the booklet can be obtained for 3d. each post paid, from the Association's offices at 52 Grosvenor Gardens, S.W.1.

ACCORDING to the Board of Trade returns for the month ended June, 1940, imports of chemicals, drugs, dyes and colours in the United Kingdom were valued at £1,298,100, a decrease of £191,703 compared with figures for the corresponding period last year. Exports were valued at £2,479,590, an increase of £239,410. Re-exports were valued at £60,074. For the six months ended June imports increased in value by £2,006,488 to £10,101,362 and exports by £4,754,576 to £16,731,833.

MR. JUSTICE SIMONDS, in the Chancery Division recently, confirmed an alteration of the objects of the Institution of Chemical Engineers. Mr. T. D. D. Divine, for the Institution, said that it was formed mainly to promote the science and practice of chemical engineering, but it contained among its objects one or two minor matters which were not wholly charitable. The object of the alteration was to remove these so that the Institution could obtain the exemption from income tax given to bodies established for charitable purposes only. The Board of Trade offered no objection to the alteration.

WATER ENTERING A BOILER, causing tar to seethe and spread to the fire-box, is believed to have been the cause of an outbreak of fire at the yard of Brights Asphalt Contractors, Ltd., The Quay, Exeter, on Tuesday last week. The Exeter Fire Brigade found flames and smoke pouring from a boiler containing 150 gallons of tar, which had been unsuccessfully tackled with dust by the foreman and a number of employees. The brigade used a foam compound and were quickly able to extinguish the fire, saving the platform on which the boiler stood, as well as a near-by boiler containing 300 gallons of tar and a valuable tarmac mixing plant.

Foreign News

COMMERCIAL ALCOHOLS, LTD., Montreal, expect to increase capacity by 50 per cent. by equipment now on order, according to a report in *Canadian Chemistry and Process Industries*. This company not only produces alcohol, but possesses a very active division concerned with magnesia insulating materials.

ACCORDING TO THE SOUTH AUSTRALIAN Minister for Mines, Mr. McEwin, reported in the *Industrial Australian and Mining Standard*, the decision of the Broken Hill Pty. Co., Ltd., to manufacture ferro-manganese in Australia has created a domestic market for the high-grade ore that South Australia is able to produce. The dolomite field gave promise, if surface indications were maintained, of yielding 1,000,000 tons of material by open crosscutting, and prospecting for other deposits is in progress.

AN EXPORT CUSTOMS duty of 0.5 per cent. *ad valorem* has been imposed on all exports of drugs of Indian origin exported from India.

NICKEL ORE DEPOSITS with a high metal content and accompanied by chromite have been located in the Kochi prefecture of Japan.

A NUMBER OF SOAP FACTORIES in Sicily are reported, by the U.S. Consul at Palermo, to have discontinued operations on account of the scarcity of raw materials.

THE MANUFACTURE OF HYPOCHLORITE has been started at Surabaya, Dutch East Indies, owing to the difficulties attending importation since the outbreak of war.

A CALCIUM CARBIDE PILOT PLANT with an annual capacity of 5000 tons is to be erected at Hsinking by the Manchurian Electrochemical Company. It will serve as a basis for the experimental production of synthetic rubber.

PRODUCTION IN CANADA of iron oxides and ochres, crude and refined, during 1939 amounted to 6015 tons, valued at $88,418, compared with 5821 tons, worth $71,769, in 1938. Of the 1939 total 5465 tons came from properties in Quebec province, and the remainder represented crude material from British Columbia.

EFFORTS ARE BEING MADE in Italy to develop the native deposits of leucite (potassium aluminium silicate) as sources of both potash and aluminium. Small-scale plants are already operating and one of these (belonging to the Prodotti Chimici Nazionali at Civitavecchia) makes use of a new process involving treatment with sodium chloride.

THE UNITED STATES GOVERNMENT has given an order to E. I. du Pont de Nemours and Co. to construct and operate a smokeless powder plant capable of producing 200,000 lb. of powder daily. The plant will be built near Charlestown, Indiana, and it is to be completed in ten months. Three other powder plants are to be erected in the Middle West.

THE FINAL SUMMARY of the Indian linseed oil crop forecast, published in the *Indian Trade Journal*, indicates an output of 467,000 tons for the season 1939-40. This represents an increase of 6 per cent. on the corresponding figure (442,000 tons) for the previous season. The area covered by the summary is a little over 94 per cent. of the total linseed area of India, and is actually 4 per cent. less than that planted last year.

VARIOUS METHODS FOR THE REMOVAL of sulphuric acid droplets from stack gases of acid plants have been evaluated by D. W. Bransky and F. F. Diwoky, Standard Oil Company, Indiana, in a paper presented at the Mid-Year Meeting of the American Petroleum Institute. Effective methods include the filtration of the stack gases through various wetted media; the decomposition of the acid mist by heating to 1000° F. or above under controlled conditions of combustion; the use of Cottrell precipitators and the use of steam ejectors with subsequent condensation of the steam.

FOUR BILLS TO CONSOLIDATE and amend patents, trade marks, designs and copyright, and trading with the enemy acts, have been introduced into the Australian House of Representatives by the Attorney-General (Mr. Hughes). Because of the involved nature of the measures the unusual course has been taken of referring them to an informal committee of all parties, which will examine them and report back to the House on clauses that should be discussed. Mr. Hughes explained that the new legislation would bring Australian patent laws into line with modern practice throughout the world, and in the United Kingdom in particular.

ACCORDING TO THE REPORT of the Japanese Patent Office for 1939, the I. G. Farbenindustrie and its subsidiaries were responsible for a larger number of patents during the year than any other firm, Japanese or foreign. Since the outbreak of war, however, the I.G. has not filed any fresh applications. Similar precautions have been taken by English and French chemical concerns. The great American chemical houses have hitherto abstained from patenting their inventions in Japan. In regard to patents by Japanese firms, the language is an almost insuperable obstacle to foreigners desiring to appraise their worth (except in the few cases when these are also patented abroad). It may be pointed out, however, that the great majority are of purely local interest.

Weekly Prices of British Chemical Products

THE market for general chemicals continues to follow a very steady course, there being no outstanding movements to record in any direction. Quite a good interest has been maintained for most of the industrial chemicals and deliveries against contracts cover good volumes. A fair inquiry is reported for acetic, tartaric, and oxalic acids with the last item in rather limited supplies. The demand for salammoniac, formaldehyde and acetone, lead oxides, and the majority of the soda products is about normal for the period. Offers of barium chloride and arsenic are scarce, market quotation for arsenic 99/100 per cent. being about £30 0s. 0d. per ton ex store. Shipments of carbonate and caustic potash are now subject to supervision and supplies are available only for approved requirements, and both these items are on a nominal basis. There is little movement to report in the market for coal tar products. Prices throughout continue steady with a firm undertone.

MANCHESTER.—With an odd exception values remain on a steady to firm basis on the Manchester chemical market. Fresh inquiry during the past week has not been particularly brisk, the uncertain outlook for the Lancashire cotton trade being an unsettling influence so far as the important range of textile chemicals is concerned, though in most directions good quantities continue to be absorbed against old commitments. In the by-products section pitch is quiet and largely nominal, whilst the naphthalenes are easier in tendency, with offerings on a somewhat better scale. Most of the other tar products, however, remain steady and fair quantities are moving into consumption.

GLASGOW.—In Scotland this past week orders for heavy chemicals are well up to expectation with values well maintained. It is noticeable that inquiries are being made for substitutes for the commodities which used to be imported from the Continent. Otherwise business is quite normal.

Price Changes

Rises: Arsenic, Arsenic Sulphide, Barytes, Creosote, Dichloraniline, Dinitrotoluene, Lamp Black, Naphthalene, Nitronaphthalene, *p*-Toluidine, Sulhpur, Vermilion.

Falls: Naphthalene (Manchester).

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton £36 10s.; 10 cwt./1 ton, £37 10s.; 4/10 cwt., £38 10s.; 80% pure, 1 ton, £38 10s.; 10 cwt./1 ton, £39 10s.; 4/10 cwt., £40 10s.; commercial glacial, 1 ton, £46; 10 cwt./1 ton, £47; 4/10 cwt., £48; delivered buyers' premises in returnable barrels. £4 per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £52 10s.; 10/50 tons, £53; 5/10 tons, £53 10s.; 1/5 tons, £54; single drums, £55, delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each; delivered in containers of less than 45 gallons but not less than 10 gallons £10 10s. per ton in excess of maximum prices; delivered in containers less than 10 gallons each £10 10s. per ton in excess of maximum prices, plus a reasonable allowance.

Alum.—Loose lump, £9 10s. per ton, d/d, nominal.

Aluminium Sulphate.—About £9 10s. per ton d/d.

Ammonia Anhydrous.—99.95%, 1s. to 2s. per lb., according to quantity in loaned cylinders, carriage paid; less for important contracts.

Ammonium Carbonate.—£32-£36 per ton d/d in 5 cwt. casks.

Ammonium Chloride.—Grey galvanising, £18 per ton, in casks, ex wharf. See also Salammoniac.

Antimony Oxide.—£68 per ton.

Arsenic.—99/100%, about £30 per ton, ex store.

Barium Chloride—98/100%, prime white crystals, £11 10s. 0d. to £13 per ton, bag packing, ex works; imported material would be dearer.

Bleaching Powder.—Spot, 35/37% £10 per ton in casks, special terms for contract.

Borax, Commercial.—Granulated, £23; crystals, £24; powdered, £24 10s.; extra fine powder, £25 10s.; B.P. crystals, £32; powdered, £32 10s.; extra fine, £33 10s. per ton for ton lots, in free 1 cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £68; powder, £69 per ton in tin-lined cases for home trade only, packages free, carriage paid in Great Britain.

Boric Acid.—Commercial, granulated, £37 10s.; crystals, £38 10s.; powdered, £39 10s.; extra fine, £41 10s.; large flakes, £50; B.P. crystals, £46 10s.; powdered, £47 10s.; extra fine powdered, £49 10s. per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain.

Calcium Bisulphite.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/75% solid, £5 11s. per ton ex store.

Charcoal Lump.—£10 10s. to £11 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£19 15s. per ton, d/d in 16/17 cwt. drums (3-drum lots); 4¾d. per lb. d/d station in single 70-lb. cylinders.

Chrometan.—Crystals, 4½d. per lb.; liquor, £19 10s. per ton d/d station in drums. GLASGOW: Crystals 4d. per lb. in original barrels.

Chromic Acid.—1s. 2d. per lb., less 2½%; d/d U.K. GLASGOW: 1s. 0¼d. per lb. for 1 cwt. lots.

Citric Acid.—1s. 2d. per lb. MANCHESTER: 1s. 5½d.

Copper Sulphate.—About £30 per ton d/d.

Cream of Tartar.—100%, £6 9s. 6d. per cwt., less 2½%, d/d in sellers' returnable casks; imported material would be dearer.

Formic Acid.—85%, £44 10s. per ton for ton lots, carriage paid, carboys returnable; smaller parcels quoted at 46s. 6d. to 49s. 6d. per cwt., ex store.

Glycerine.—Chemically pure, double distilled, 1,260 s.g., in tins, £3 10s. to £4 10s. per cwt. according to quantity; in drums, £3 2s. 6d. to £3 16s. 0d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, 1s. 4d. per lb.; free-running crystals are quoted at 1s. 7½d. to 1s. 10½d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 6s. 1½d. to 8s. 7½d. carboy d/d according to purity, strength and locality.

Iodine.—Resublimed B.P., 9s. 2d. to 13s. per lb., according to quantity.

Lactic Acid.—Dark tech., 50% by vol., £33 per ton; 50% by weight, £38;; 80% by weight, £67; pale tech., 50% by vol., £39 10s.; 50% by weight, £46, 80% by weight, £74. Not less than one ton lots ex works; barrels returnable, carriage paid.

Lead Acetate.—White, £48 to £50, ton lots.

Lead Nitrate.—About £44 per ton d/d in casks.

Lead, Red.—English, 5/10 cwt. £42; 10 cwt. to 1 ton, £41 15s.; 1/2 tons, £41 10s.; 2/5 tons, £41; 5/20 tons, £40 10s.; 20/100 tons, £40; over 100 tons, £39 10s. per ton, less 2½ per cent. carriage paid; non-setting red lead 10s. per ton dearer in each case. Continental material £1 per ton cheaper.

Lead, White.—Dry English, less than 5 tons, £51 10s.; 5/15 tons, £47 10s.; 15/25 tons, £47; 25/50 tons, £46 10s.; 50/200 tons, £46 per ton less 5 per cent. carriage paid; Continental material £1 per ton cheaper; ground in oil, English, 1/5 cwt., £60; 5/10 cwt., £59; 10 cwt. to 1 ton, £58 10s.; 1/2 tons, £57; 2/5 tons, £56; 5/10 tons, £54; 10/15 tons, £53; 15/25 tons, £52 10s.; 25/50 tons, £52; 50/100 tons, £51 10s. per ton less 5 per cent. carriage paid. Continental material £2 per ton cheaper.

Litharge.—1 to 2 tons, £41 per ton.

Lithium Carbonate.—7s. per lb. net.

Magnesite.—Calcined, in bags, ex works, about £12 to £15 per ton.

Magnesium Chloride.—Solid (ex wharf), £12 to £13 5s. per ton.

Magnesium Sulphate.—Commercial, £12 to £14 per ton, according to quality, ex works.

Mercury Products.—Controlled price for 1 cwt. quantities: Bichloride powder, 12s. 3d.; bichloride lump, 12s. 10d.; ammon. chloride powder, 14s. 2d.; ammon. chloride lump, 14s.; mercurous chloride, 14s. 7d.; mercury oxide, red cryst., B.P., 16s. 4d.; red levig. B.P., 15s. 10d.; yellow levig. B.P. 15s. 9d.

Methylated Spirit.—Industrial 66 O.P. 100 gals., 2s. 0½d. per gal.; pyridinised 64 O.P. 100 gals., 2s. 1½d. per gal.

Nitric Acid.—S.G. 1420, £28 10s. to £30 per ton ex works.

Oxalic Acid.—From £60 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

Potash, Caustic.—Nominal.

Potassium Bichromate.—Crystals and granular 6d. per lb.; ground, 7d. per lb., carriage paid.

Potassium Carbonate.—Nominal.

Potassium Chlorate.—Imported powder and crystals, ex store London, 10d. to 1s. per lb.

Potassium Iodide.—B.P., 8s. to 11s. 2d. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, £26 to £29 per ton ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 4½d. to 1s. 5½d. per lb.; commercial, £7 9s. 6d. to £8 1s. 6d. per cwt., according to quantity, d/d.

Potassium Prussiate.—Yellow, about 1s. 2d. to 1s. 5d. per lb., supplies scarce.

Salammoniac.—Dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £16 10s. per ton, in casks, ex store.

Soda, Caustic.—Solid, 76/77% spot, £14 per ton d/d station.

Soda Crystals.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

Sodium Acetate.—£37 to £40 per ton, ex wharf.

Sodium Bicarbonate.—About £10 10s. to £11 10s. per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 5d. per lb., anhydrous, 6d. per lb. net d/d U.K. GLASGOW: 5¾d. per lb., carriage paid.

Sodium Bisulphite Powder.—60/62%, £16 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£32 10s. to £41 10s. per ton, d/d, according to quantity.

Sodium Hyposulphite.—Pea crystals, £17 15s. per ton for 2-ton lots; commercial, £13 10s. per ton. MANCHESTER: Commercial, £13 10s.; photographic, £17 10s.

Sodium Iodide.—B.P., for not less than 28 lb., 8s. 10d. per lb.; for not less than 7 lb., 10s. 9d. per lb.

Sodium Metasilicate.—£14 5s. per ton, d/d U.K. in cwt. bags.

Sodium Nitrate.—Refined, £9 10s. to £10 per ton for 6-ton lots d/d.

Sodium Nitrite.—£18 15s. per ton for ton lots.

Sodium Perborate.—10%, £4 10s. per cwt. d/d in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £17 per ton, delivered, for ton lots. Tri-sodium, £20 to £21 per ton d/d for ton lots.

Sodium Prussiate.—From 6d. per lb. ex store.

Sodium Silicate.—£8 2s. 6d. per ton, for 4-ton lots.

Sodium Sulphate (Glauber Salts).—£4 10s. per ton d/d.

Sodium Sulphate (Salt Cake).—Unground, Spot, £4 1s. per ton d/d station in bulk. MANCHESTER: £4.

Sodium Sulphide.—Solid 60/62%, Spot, £13 15s. per ton d/d in drums; crystals, 30/32%, £9 10s. per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62 per cent., £13 10s.; crystals, £9 15s.

Sodium Sulphite.—Pea crystals, spot, £16 per ton d/d station in kegs; commercial, £11 per ton d/d station in bags.

Sulphur Precip.—B.P., £65 per ton.

Sulphuric Acid.—168° Tw., £6 2s. 3d. to £6 13s. 3d. per ton; 140° Tw., arsenic-free, £4 7s. 6d. to £4 17s. 6d. per ton; 140° Tw. arsenious, £4 per ton; quotations naked at sellers' works.

Tartaric Acid.—1s. 8¾d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. Makers' prices nominal; imported material 2s. 3d. to 2s. 6d. per lb., ex wharf. MANCHESTER: 1s. 9d. per lb.

Zinc Oxide.—Maximum prices: White seal, £30 17s. 6d. per ton; red seal, £28 7s. 6d. d/d; green seal, £29 17s. 6d. d/d buyers' premises.

Zinc Sulphate.—Tech., about £25, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 9½d. to 1s. 6d. per lb., according to quality. Crimson, 1s. 10d. to 2s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9½d. per lb.

Barytes.—Imported material £10 to £12 per ton according to quality.

Cadmium Sulphide.—6s. 6d. per lb.

Carbon Black.—5d. to 7¾d. per lb., according to quantity.

Carbon Bisulphide.—£31 to £36 per ton, according to quantity, in free returnable drums.

Carbon Tetrachloride.—£46 to £49 per ton.

Chromium Oxide.—Green, 1s. 6d. per lb.

India-rubber Substitutes.—White, 5¾d. to 8½d. per lb.; dark 5¼d. to 6d. per lb.

Lamp Black.—Imported material is quoted at about £46 to £48 per ton.

Lithopone.—30%, £18 17s. 6d. per ton; 60%, £31 to £32 per ton. Imported material would be dearer.

Mineral Rubber, "Rupron."—£16 per ton.

Sulphur.—Finely powdered, about £16 10s. per ton, delivered.

Sulphur Chloride.—7d. per lb.

Vegetable Black.—£35 per ton upwards; 28/30%, £15 10s. 0d.; 60%, £29, delivered buyers' premises.

Vermilion.—Pale or deep, 13s. 9d. per lb., for cwt. lots.

Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate Fertilisers.—£14 11s. 9d. to £19 19s. 6d. per ton in 6-ton lots, September delivery, with a rebate of 1s. 6d. per ton for August delivery, and 3s. per ton for July delivery, d/d farmer's nearest station.

Ammonium Sulphate.—£9 13s. 0d. per ton in 6-ton lots, September delivery, with a rebate of 1s. 6d. per ton for August delivery and with a rebate of 3s. per ton for July delivery, d/d farmer's nearest station.

Calcium Cyanamide.—£21 per ton, c.i.f., on 24 per cent. basis; supplies small.

Concentrated Complete Fertilisers.—£14 13s. 9d. to £14 19s. 3d. per ton in 6-ton lots, September delivery, with a rebate of 1s. 6d. per ton for August delivery and 3s. per ton for July delivery, d/d farmer's nearest station.

"Nitro-Chalk."—£9 14s. 0d. per ton in 6-ton lots, d/d farmer's nearest station, July/September delivery.

Coal Tar Products

Benzol.—Industrial (containing less than 2% of toluol), 2s. to 2s. 1d. per gal., **ex works.**

Carbolic Acid.—Crystals, 9d. 11d. per lb.; Crude, 60's 3s. 6d. to 4s., according to specification. MANCHESTER: Crystals, 10½d. per lb., d/d; crude, 4s. to 4s. 3d. naked, at works.

Creosote.—Home trade, 5½d. to 6d. per gal., f.o.r., makers' works; exports 6d. to 6½d. per gal., according to grade. MANCHESTER: 5d. to 7d. per gal.

Cresylic Acid.—99/100%, 2s. 11d. to 3s. per gal., according to specification. MANCHESTER: Pale, 99/100%, 2s. 7d.

Naphtha.—Solvent, 90/160°, 1s. 7d. to 1s. 8d. per gal.; solvent, 95/160°, 1s. 11d. to 2s., naked at works. MANCHESTER: 90/160° 1s. 11d. to 2s. per gal.

Naphthalene.—Crude, whizzed or hot pressed, £10 to £11 per ton; purified crystals, £26 per ton in 2-cwt. bags; flaked, £27 per ton. Fire-lighter quality, £6 to £7 per ton ex works. MANCHESTER: Refined, £30.

Pitch.—Medium, soft, 50s. per ton f.o.b. MANCHESTER: 50s. (nominal), f.o.b. East Coast.

Pyridine.—90/140°, 20s. to 25s. per gal.; 90/160°, 18s. 6d. to 19s. 6d.; 90/180°, 4s. to 5s. per gal., f.o.b. MANCHESTER: 19s. to 22s. 6d. per gal.

Toluol.—Pure, 2s. 5d., nominal. MANCHESTER: Pure, 2s. 5d. per gal., naked.

Xylol.—Commercial, 2s. 9d. per gal.; pure, 2s. 11d. MANCHESTER: 2s. 11d. per gal.

Wood Distillation Products

Calcium Acetate.—Brown, £8 10s. to £10 per ton; grey, £13 to £14. MANCHESTER: Grey: £18.

Methyl Acetone.—40.50%, £42-£45 per ton.

Wood Creosote.—Unrefined, 1s. to 1s. 6d. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 4s. 9d. per gal.; solvent, 4s. 6d. to 4s. 9d. per gal.

Wood Tar.—£5 to £6 per ton, according to quality.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-**Cresol** 30/31° C.—8d. to 9d. per lb. in ton lots.

p-**Cresol** 34/35° C.—1s. 8d. to 1s. 9d. per lb. in ton lots.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb., in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—July 25.—For the period ending August 3, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies:—LINSEED OIL, raw, £44. RAPESEED OIL, crude, £44 5s. COTTONSEED OIL, crude, £31 2s. 6d.; washed, £34 5s.; refined edible, £35 12s. 6d.; refined deodorised, £36 10s. SOYA BEAN OIL, crude, £33; refined deodorised, £37. COCONUT OIL, crude, £28 2s. 6d.; refined deodorised, £31 7s. 6d. PALM KERNEL OIL, crude, £27 10s.; refined deodorised, £30 15s. PALM OIL, refined deodorised, £33. GROUNDNUT OIL, crude, £35 10s.; refined deodorised, £40. WHALE OIL, crude hardened, 42 deg., £30 10s.; refined hardened, 42 deg., £33. ACID OILS.—Groundnut, £24; soya, £22; coconut and palm kernel, £22 10s. ROSIN, 25s. to 30s. per cwt., ex wharf, according to grade. TURPENTINE, 53s. per cwt., spot, American, including tax, ex wharf, barrels, and ex discount.

HULL.—July 24.—American turpentine, spot, 54s. 6d. per cwt. in barrels ex store.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ABRASIVE PRODUCTS, LTD, Bilston (Staffs.) (M., 27/7/40.) July 9, £1000 deb. and £1500 (not ex.) deb., to C. D. Marson, Stafford; general charges. *Nil. December 21, 1939.

CLAY & SON, LTD., London, E., fertiliser manufacturers. (M., 27/7/40.) July 12, charge, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on certain land at Stratford. *Nil. January 12, 1940.

MANCHESTER OIL REFINERY LTD., London, E.C. (M., 27/7/40.) June 7, letter securing to N. M. Rothschild & Sons £300,000 (not ex.); charged on certain moneys due or to become due to the company . *£290,352. September 6, 1939.

NORTH BRITISH ALUMINIUM CO., LTD., Shrewsbury. (M., 27/7/40.) June 29, disposition by Earl of Radnor with consent of the company in implement of a trust deed dated September 12, 1934; charged on estates of Glenshero & Sherramore, Laggan. *——. March 28, 1940.

ORCENE CO., LTD., London, E., chemical manufacturers. (M., 27/7/40.) July 3, £700 debenture to F. W. Hill, Stockport; first general charge.

WEST NORFOLK FARMERS MANURE & CHEMICAL CO-OPERATIVE CO., LTD., Kings Lynn. (M., 27/7/40.) July 10, debenture, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *Nil. August 29, 1939.

Chemical and Allied Stocks and Shares

NOW the provisions of the Supplementary Budget are known, the undertone in industrial securities has become slightly firmer in response to the prevailing view that the further heavy increases in taxation are in many cases already discounted in share prices. The volume of business remained small, however, and quotations for individual shares were inclined to move sharply on only moderate buying or selling. Apart from the continued strength of British Funds no very definite trend has been shown in the stock and share markets at the time of writing.

In sympathy with the general tendency in leading industrials, Imperial Chemical were slightly lower on balance, but subsequently were inclined to improve, it being pointed out that at around the current price of 23s. an apparently attractive yield is given on the basis of last year's 8 per cent. dividend. I.C.I. 7 per cent. preference went back to 28s. 3d. at one time but later were firmer at 28s. 9d. B. Laporte were around 44s. and Lawes Chemical 10s. shares continued to be quoted at 7s. 6d. but were inactive, while Fison Packard kept at 30s. Greeff-Chemicals Holdings 5s. units were slightly lower at around par, but are now " ex " the dividend. Distillers were steady at 55s. on the statements at the meeting, which included an interesting reference to the industrial alcohol position.

Lever & Unilever were no better than 17s. 6d. but after declining to 17s. 3d. the 8 per cent. preference rallied to 19s. 6d. British Oil & Cake Mills preferred ordinary were easier at 31s. 10½d. and in other directions, Barry & Staines went back to 20s. but Michael Nairn rallied slightly to 41s. 3d. following their recent decline. Triplex Glass were relatively steady around 18s. awaiting the financial results, due next month, although market dividend estimates continue to vary a good deal. Dunlop Rubber made a lower price, as did Avon India Rubber, but British Tyre & Rubber continued to be quoted at 33s. 9d. Associated Cement and other cement shares were inclined to be firmer, sentiment having again come under the influence of the large supplies required for defence works. Business in British Glues & Chemicals 4s. units took place at 4s. 3d. British Oxygen were more active, while British Aluminium regained part of their recent decline. Among preference shares, Montanto Chemicals 5½ per cents. were again quoted at 21s. 3d., while Sanitas Trust 10 per cents. were 20s. and Morgan Crucible 5 per cents. transferred around 18s. 6d. Among iron and steel securities, Stewarts & Lloyds and Tube Investments were reported to be firmer.

Borax Consolidated remained around 21s. 3d. and the 5½ per cent. £10 cumulative preference units changed hands at par, while business in the 4½ per cent. second debentures took place at 90. Earlier in the week there was an improved tendency in Courtaulds and other shares of rayon companies on the decision to raise the price of rayon. United Molasses at 17s. 9d. were little changed as compared with a week ago. Boots Drug were firmer at 34s. 6d. after an earlier decline, while Beechams Pills 2s. 6d. deferred were again around 7s. and the 10 per cent. preferred shares were slightly higher at 25s. 3d. Sangers were 17s. 6d. and Timothy Whites 16s. 6d. British Drug continued to be quoted at 22s. 6d. but were inactive. British Match were steady at 24s. 9d. Among higher-priced securities, Cerebos were close on £6½ and Reckitt & Sons ordinary 77s. Movements in " Shell " and other oil shares were mostly reactionary.

Company News

The directors of **Benn Brothers, Ltd.,** recommend the payment of the following final dividends, less tax, for the year ended June 30, 1940: 3 per cent. on preference shares, which, with the interim dividend of 3 per cent. paid in February, makes 6 per cent. for the year (same); 8 per cent. on ordinary shares, which, with the interim dividend of 4 per cent. paid in February makes 12 per cent. for the year (last year 15 per cent.); 2s. 4 4/5d. per share on the deferred shares (last year 3s.).

Trading profit of **Low Temperature Carbonisation** for the year to March 31, 1940, was £97,097 (last year £70,020). The board has recommended a dividend on the ordinary shares of 3½ per cent., less tax, the first payment since 1938, when 4 per cent. was paid. After debenture interest and directors' fees, the net profit is £29,402 (£815). The payment of the ordinary dividend reduces the carry-forward from £33,265 to £27,640. Meeting, Caxton Hall, London, S.W.1, August 2, at 11.30 a.m.

Chemical Trade Inquiries

Hong Kong.—A firm of agents established at Hong Kong wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of chemicals for Hong Kong. (Ref. No. 445.)

Iraq.—A well-established firm of agents and merchants at Bagdad wish to obtain the representation of United Kingdom manufacturers of laboratory equipment and receptacles of glass, heavy and fine chemicals, including dipping powders, sulphate of opium, etc., for Iraq. (Ref. No. 446.)